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CONTAGIOUS ABORTION OF CATTLE

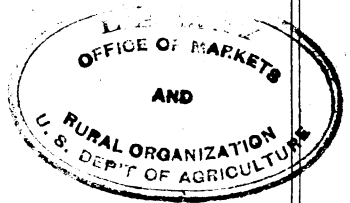
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Contribution from the Bureau of Animal Industry
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CONTAGIOUS abortion in cattle is a germ disease which causes the death of unborn calves and occasions annual losses of millions of dollars. If it continues to increase it will soon surpass tuberculosis, which is now thought to stand first among animal diseases in point of economic loss.

A bull may spread the germ from a diseased cow to healthy animals. One aborting cow in a herd may infect the whole herd.

Every cow that shows the disease should be isolated. The fetus and all discharges should be burned or buried and the stall disinfected thoroughly. The cow should be treated systematically with mild antiseptic douches, and she should not be bred again within two months and not then if the discharge has not ceased.

The premises should be cleaned, disinfected thoroughly, and thereafter maintained in a sanitary condition.

A cow that has aborted is likely to become immune to the disease, therefore if she is a profitable animal it is best to keep her.

Details of the disease and its treatment are given in the following pages.

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EXTENT OF CONTAGIOUS ABORTION.

Contagious abortion of cows, it was estimated a few years ago, caused an annual loss of \$20,000,000, but since that time it has continued to spread rapidly and widely throughout the country. In economic importance the disease is second only to tuberculosis, and is fast approaching first place. Formerly confined almost entirely to dairy cows, it has now spread to the beef herds upon the range, where the losses are proving especially severe. It is imperative that the stockmen, as well as the dairymen, awake to the seriousness of the situation, and combine for a systematic campaign against the disease.

NATURE OF ABORTION DISEASE.

Abortion disease is a specific, infectious disease, which is caused by a small germ known as the *Bacillus abortus* of Bang. The chief and best known symptom of the disease is the death and expulsion of the undeveloped fetus. This is brought about by the entrance of the germ into the pregnant uterus, where, growing and multiplying, it causes a separation between the maternal and fetal membranes. The attachment between the fetus and the mother being thus broken, the fetus is not supplied with nourishment and oxygen, and of course dies. It then acts as a foreign body and is expelled, and this is called "abortion." Thus it can readily be understood that abortion is but one of the symptoms and not the disease itself.

Other manifestations are recognized by those familiar with the disease. The infection does not always result in the death of the fetus. It frequently happens that the resisting power of the mother prevents abortion, or that the disease-producing power of the germ is not great enough to kill the fetus, and the calf is born alive and

at full term. Under these conditions an inflammation is frequently produced which causes adhesions of the membranes, and there occurs what is known as retained afterbirth. Unless these membranes are removed in a proper manner their subsequent decomposition will produce inflammation of the uterus, or even blood poisoning, which may cause the death of the cow.

Sterility is another sequel of abortion. Frequently it is a result of neglect following an abortion or retained afterbirth, where infection with pus-producing germs causes permanent changes in the genital organs. Again, sterility may be but temporary, from the persistence of the infective agent in the uterine cavity. But whatever the cause, sterility can, to a considerable degree, be prevented by prompt treatment following abortion and retained afterbirth.

White scours and calf pneumonia are common accompaniments of abortion, and exact a heavy toll.

An animal may have acquired infection and not abort, or the calf may be born alive at full term but be so weak that it soon succumbs to one of the calf ailments; yet that cow is just as truly affected with abortion disease as though she had dropped an undeveloped fetus at seven months. The foregoing facts add to the complexity of the problem and the difficulty of overcoming the disease.

Many persons have thought that abortion was due to various other causes, such as injury, spoiled feed, or certain herbs; but by far the largest percentage is of the infectious type. Abortions do occur, however, in the course of other diseases, where as a result of the disturbed condition of the maternal circulation the fetus is not properly nourished and dies. It is likewise possible for injury to cause the death of the undeveloped animal, but the fetus is so well protected within the body of the mother that more than the ordinary injury is required to cause its death.

SYMPTOMS.

The signs of approaching abortion are usually those which precede normal calving, with the exception that they are premature. Two or three days before abortion there will be swelling of the udder ("making bag"), swelling of the external genitals, and the appearance of a mucoid or mucopurulent, odorless discharge from the vagina. These symptoms may not, however, always appear, and abortion may occur without warning. In young animals and in those aborting for the first time the abortion usually occurs at an early period, and the fetus, surrounded by the intact membranes, is expelled. This may occur in the third or fourth month of pregnancy and may pass unnoticed because of the smallness of the fetus and the absence of any disturbance in the health of the cow. It may then be thought that

the cow had failed to conceive. On the other hand, where abortion takes place in the seventh or eighth month of pregnancy, retained afterbirth is a common occurrence, and the act is accompanied by restlessness and pain. In some cases pregnancy may continue almost to full term and the calf may be born alive but weak and may soon die. In herds where the disease is known to be present these cases too should be considered as abortions.

Following abortion there is a characteristic dirty, yellowish-gray, flaky, and at times bloody discharge, which may persist for two weeks or more. If the membranes are retained their decomposition may cause blood poisoning and death, or if the cow is able to survive, permanent changes may result which render her permanently sterile. If proper treatment is given promptly, these changes frequently may be prevented and the breeding function preserved to the animal.

In practically all cases of abortion disease, if the affected animals were killed, a variable quantity of a yellowish to dark brown fluid, characteristic of this disease, would be found separating the fetal and maternal membranes. The lining membrane of the uterus is usually swollen, hemorrhagic, and roughened, and in some cases may show areas of decomposition. The cotyledons or so-called "buttons" are most severely affected, frequently being pale, soft, decomposed, and surrounded by exudate. The membranes may be thickened and leathery in appearance. Somewhat rarely the fetus may be retained and dries up to form a mummy. If infection with pus-producing germs follows abortion and persists for a considerable time, the walls of the uterus may become thickened, and the ovaries diseased, and permanent sterility results.

If abortion is not complicated by retained afterbirth or sterility, it does not markedly affect the health of the individual animal. The act of abortion is not accompanied by any disturbance in condition other than is seen in normal calving. The cow continues to eat and act normally, the discharge soon ceases, and she may soon breed again and afterward produce a living calf. Consequently, the tendency among owners has been to assign other reason than infection for the first few abortions, either because of lack of knowledge of the disease or because they were loath to believe that it had gained entrance to the herd. As the disease develops slowly, not much attention usually is given to the first cases; the cows are neglected, the proper sanitary measures are not employed, and the infection is disseminated throughout the herd. This may continue until a perfect storm of abortion, with all of its attendant conditions of retained afterbirth, sterility, and weakling calves, compels attention. If the owner, knowing the danger, had taken proper precautions with the first cases, an outbreak might have been avoided. In view of the

insidious nature of the disease and the difficulty of tracing its path of introduction, it is always advisable to regard an abortion as of the contagious variety and to take ample precautions.

HOW ABORTION IS SPREAD.

It is necessary before attempting to control a disease to determine how it is spread. All investigators do not agree as to the avenues of infection, but practically all will admit that the disease is spread either by the bull at time of service or through the digestive tract by means of contaminated feed and water. The germs are contained in the discharge from the genital organs of affected cows and in the aborted fetus and its membranes. Consequently the disease is disseminated throughout the herd by this material coming in contact with the feed, because of insanitary methods about the stable, or by allowing a discharging cow to contaminate the pastures. Moreover, when the bull serves such a cow his genitals become contaminated, and the infection is transmitted mechanically to the next cow he serves. Abortion is usually conveyed from herd to herd by the introduction of a diseased cow, which then infects the bull; or a bull from a diseased herd is purchased, and he in turn infects the cows. Among small herds, where bulls are kept for public service, the disease may be disseminated throughout the community unless suitable precautions are taken. It is evident from the foregoing that by proper disposal of infective material great progress can be made toward the control of the disease, and this fact is the basis of recommendations for a system of treatment which will be given under the proper heading.

IMMUNITY.

Affected cows do not continue to abort indefinitely. Much more than 50 per cent abort but once, relatively few abort twice, and a very small percentage lose their calves the third time, and thereafter they produce living calves. It is evident, therefore, that an immunity is produced. It is the hope of scientists to develop an effective immunizing agent which will induce this immunity without causing the loss of the fetus, but this hope has not yet been realized fully.

This immunity, while highly desirable in the individual animal, is sometimes a source of danger to the herd, in that the immune cow may continue to harbor the infection. These so-called infection "carriers," themselves apparently normal in every respect, may yet contaminate the bulls and in various ways the feed and water. Such cows have been known to excrete the germs in their milk for many years. These facts add to the difficulty of controlling the disease and make necessary the precautions recommended.

Recently biological products such as vaccines, bacterins, and serums have come into use for immunizing cows against abortion, but they have not passed the experimental stage and have not proved entirely satisfactory. Many of the claims made for them by the manufacturers are extravagant and not justified by the facts. It is not the intention to discourage their use, for the theory on which their preparation is based has been found correct in relation to other diseases; but it is desirable that conclusive evidence of their effectiveness be obtained before their general use can be recommended. The partial success of these products induces the hope that an effective immunizing agent may yet be developed. Recent investigations seem to indicate that they are most effective when used several weeks before breeding. The chronic and insidious nature of abortion, however, makes prolonged observation necessary, and several years of experimentation may be required before the true value of these products can be determined.

DIAGNOSIS.

How may the owner know when abortion has gained a foothold in his herd? It has been shown that abortion is nearly always of the specific, contagious type, therefore an abortion, or especially several abortions, occurring under such conditions that other causes can be eliminated, should cause suspicion. The fact that there have been numerous abortions accompanied by the characteristic discharge is sufficient evidence of the presence of the disease,

Investigators, in addition to establishing these facts, employ the blood tests, in which the serum of the blood is tested by special laboratory methods. These are practicable only where the blood samples can be drawn by a veterinarian or other qualified person and suitably prepared and forwarded to the laboratory.

PREVENTION AND TREATMENT.

The owner whose herd has escaped this disease is fortunate. If he is wise he will want to know how to prevent its introduction and will take all necessary precautions. On the other hand, the man into whose herd abortion has already come because he was not aware of the danger will ask for a cure and a means to prevent its dissemination throughout the herd. In the past drugs have been resorted to, and at various times carbolic acid, methylene blue, and other substances have been hailed as specifics, but all have been discarded as ineffective. It may be said with safety that at present *no reliable cure for abortion is known*. The standard antiseptics are more reliable and cheaper than proprietary remedies.

Abortion can to a large degree be prevented and controlled by intelligent and thorough treatment, but a study of the following

recommendations will show that it is not a lazy man's job, and that one's best efforts will be required. Moreover eternal vigilance is the price of success.

In combating abortion, where such thoroughgoing methods are required, material, time, and energy should not be wasted on animals of doubtful value. Butcher the "boarders" and concentrate on the profitable cows. The added attention bestowed upon the good animals will be more than repaid by the results.

HERD MANAGEMENT.

Three principal lines of treatment are employed in combating abortion. First, herd management, including control of breeding, plays an important part. It has been the practice of some owners to sell all aborting cows. This practice is not only economically wrong, but it does not serve to eradicate the disease. It has been pointed out that there is a tendency toward immunity, and more than half of the affected cows do not abort a second time. It would seem the part of wisdom, then, to keep the aborting cow, provided she is otherwise profitable enough to warrant the added expense, and by proper treatment to restore her to usefulness. Such a cow, having acquired immunity, would be more valuable in an infected herd than a susceptible animal, which would in turn abort. Moreover, when a man sells a cow he is often under the necessity of replacing her, and if he purchases from a clean herd the new cow will be susceptible. He has not eliminated the infection from his herd or premises, and consequently the newcomer will contract the disease. It has been demonstrated that thus to introduce susceptible animals into an infected herd is one means of perpetuating the disease. If, on the other hand, he purchases animals of unknown origin, he may be buying some other man's aborters, or animals that for some reason are less valuable than his own, and he is no better off than before. It is becoming increasingly difficult to purchase good breeding animals, and in view of the foregoing facts an owner should hesitate to dispose of a valuable animal because she aborts. Unless the aborting cow is sent to slaughter she is purchased by some unsuspecting person and may be the means of introducing a contagious disease into one more herd. This may be considered smart practice by some, but it is of course dishonest. Already laws are contemplated for the suppression of this abuse, which is having a disastrous effect.

It is sometimes necessary to introduce new blood for the purpose of building up a herd, the owner of pure breeds desiring new blood lines and the owner of grades wishing to grade up his herd by the use of registered sires. It is unsafe to purchase mature animals, unless the purchaser can be sure that they are free from disease. A better practice is to purchase the new animals as calves, whether male

or female, and raise them in an environment where there is no possibility of contamination.

Great care should be used in purchasing cattle, and cows not known to be free from the disease should be kept in separate quarters until this point is determined. If a herd bull is not kept, then great care should be exercised to know that the animal used to serve the cows is free from disease and to see that he is properly treated, as herein-after recommended, both before and after service.

It is assumed that owners desire to improve their herds. That being the case, the calves are the most valuable product of the herd, as improvement comes only through selection of the offspring of the best individuals properly mated. There is another reason for retaining the calves. Recent observations seem to indicate that calves born in affected herds and raised in that environment have a tolerance for the disease and are less liable to abort than heifers from free herds. This has been shown in the case of one large herd which has been under observation by the Bureau of Animal Industry for more than nine years. During the years that the herd was being replenished by purchase abortions were frequent, but that practice was discontinued, and the heifer calves born in the herd have been raised. Since that time abortions have progressively decreased, until at present losses have practically been eliminated, although some of the cows continue to react to the tests. Thus a herd immunity seems to have developed as the result both of keeping the aborting cows and raising the calves. Therefore it seems safest for a herd owner to raise his own calves and avoid bringing in new infection.

The proper handling of cows in advanced pregnancy plays an important part in the production of healthy calves. The cow should be withdrawn from the herd about one month before calving, and placed in light, clean, comfortable quarters. Every well-equipped establishment should have a maternity stable built to suit the size of the herd. It should be constructed of material—preferably cement—that will permit of thorough disinfection, and should have the maximum of sunlight and adequate ventilation. Individual box stalls are desirable. The stalls should be thoroughly disinfected and white-washed before use, and thereafter kept bedded with clean straw. Some authorities recommend that an antiseptic bath be given the cow before she is placed in the new quarters, and in addition they douche the vagina two or three times a week with mild, nonirritating antiseptics. This practice, if consistently followed, will tend to prevent the diseases of young calves, such as white scours and calf pneumonia, and will repay for the effort expended in valuable calves saved. The feeding of the pregnant animal is also important. Constipation at this time should be avoided, and laxative feeds, such as bran, oil meal, silage, roots, or other succulent feed should be given.

The isolation of aborting animals is a feature of herd management which is of the utmost importance. The aborting cow contaminates with her discharges the stable or the pasture, and the infection is then transmitted to the healthy cows in various ways. Removing the discharging cow minimizes the chances of infection for the susceptible animals. Isolation does not mean neglect. The isolated cow should receive prompt, thorough, and intelligent treatment if she is to regain her usefulness. Experience has shown that sterility may often be prevented by this course.

Whenever it becomes necessary to separate diseased and healthy animals, it is important that precautions be taken to prevent carrying infection, on clothing or shoes, from the diseased to the healthy cows. If it is not practicable to provide a special attendant, then by putting on rubber boots and a linen duster, or suit of overalls which can be kept clean, and are removed as soon as the special work has been finished, it would be possible to avoid spreading the disease. The boots should be washed with strong antiseptic on leaving the inclosure. The isolated cows should be attended to only after the work with the healthy animals has been completed.

DISINFECTION OF PREMISES.

A second line of prevention consists of the disinfection of premises. It is one of the best known of all facts connected with preventive medicine that dark, damp, poorly ventilated buildings in which filth, dust, and litter have been allowed to accumulate, harbor, and transmit the germs of contagious diseases. On the other hand, stables so constructed that filth can not accumulate, that are well drained, well ventilated, and flooded with sunlight, seldom act as breeding places for disease. Proper construction, then, is of considerable importance in maintaining a healthy herd.

Chemical disinfectants are also used to good advantage in controlling disease. The following directions for their use are given:

1. Sweep ceilings, side walls, stall partitions, floors, and other surfaces until they are free from cobwebs and dust.

2. Remove all accumulations of filth by scraping. If woodwork has become decayed, porous, or absorbent it should be removed, burned, and replaced with new material.

3. If the floor is of earth remove 4 inches from the surface, and in places where it shows staining with urine a sufficient depth should be removed to expose fresh earth. All earth removed should be replaced with earth from an uncontaminated source, or a new floor of concrete may be laid, which is very durable and easily cleaned.

4. The entire interior of the stable, especially the feeding troughs and drains, as well as milking stools and all other implements, should be saturated with a disinfectant, as liquor cresolis compositus (U. S.

P.) or carbolic acid, 6 ounces to every gallon of water in each case. After this has dried, the stalls, walls, and ceilings may be covered with whitewash (lime wash), to each gallon of which should be added 4 ounces of chlorid of lime.

5. All refuse and material from the stable and the barnyard should be removed to a place not accessible to cattle or hogs. The manure should be spread on fields and turned under. In addition the yards should be disinfected by sprinkling liberally with a solution of copper sulphate, 5 ounces to a gallon of water.

The best method of applying the disinfectant and the lime wash is by means of a strong spray pump, such as is used by orchardists. This method is efficient in disinfecting against most of the contagious and infectious diseases of animals, and should be applied immediately following any outbreak, and as a matter of precaution it may be used once or twice yearly.

6. It is important that arrangements be made to admit a plentiful supply of sunlight and fresh air by providing an ample number of windows, thereby eliminating dampness, stuffiness, bad odor, and other insanitary conditions. Good drainage is also very necessary.

TREATMENT OF THE BULL.

Another line of treatment, but not least in importance, is the treatment of the individual animal.

To prevent the bull from carrying the infection from a diseased cow to a healthy one, first clip the tuft of long hair from the opening of the sheath, then disinfect the penis and sheath with a solution of $\frac{1}{4}$ to $\frac{1}{2}$ per cent of liquor cresolis compositus, lysol, or 1 per cent carbolic acid,¹ or 1 part to 1,000 potassium permanganate in warm water. The only apparatus necessary for the disinfection is a soft rubber tube five-eighths inch in diameter and 5 feet long, with a large funnel attached to one end; or an ordinary fountain syringe and tube would serve the purpose. If large numbers of animals are to be treated a bucket can be fitted with a small faucet to which the tube is attached. This can be suspended from the ceiling or from the rail of the litter carrier. The tube should be inserted into the sheath and the foreskin held with the hand to prevent the immediate escape of the fluid. If a funnel is used elevate it as high as possible and pour in the fluid until the preputial sac is filled. In addition to this the hair of the belly and inner sides of the thighs should be sponged with antiseptic of twice the strength. This disinfection should invariably precede and follow every service.

¹ Two tablespoonfuls of fluid equal 1 ounce; therefore this amount of antiseptic added to 6 pints of boiled water will make approximately a 1 per cent solution.

TREATMENT OF THE COW.

An aborting cow should receive immediate attention and should be removed to separate quarters where she can receive appropriate treatment. The fetus, membranes, and discharges are particularly dangerous and should be gathered up and destroyed immediately by burning or burial in some safe place, and this followed by thoroughly disinfecting the stall. The uterus should be irrigated daily with one of the antiseptics mentioned for the bull, using the same apparatus, and irrigation should be continued until discharge ceases. Lugol's solution¹ in a strength of 2 per cent has been found to be desirable as a uterine douche. It is not permitted to remain in the uterus but is flushed out with salt solution.²

The action of the antiseptic should be noted, and if it causes straining or irritates the tender membranes of the genital organs a less irritating or a weaker solution should be used. In addition the external genitals, the root of the tail, the escutcheon, etc., should be sponged daily with a solution twice as strong as that used for irrigation, and this latter treatment should be given the nonaborters as well.

Should the preliminary symptoms of abortion be detected, the animal should be removed from the herd and treated as above prescribed.

Retention of the afterbirth is a serious matter. The afterbirth should not be forcibly removed, as the lining membranes of the uterus would be torn and a point of entry thus provided for the germs which cause blood poisoning. The uterus is very susceptible to this form of infection at such times, and injury should be carefully avoided. Clumsy and forcible manipulation of the parts may cause infection and death of the animal. The best practice is to flush the uterus twice daily with a mild antiseptic to prevent the accumulation and absorption of poisonous products, and allow the membranes to come away of themselves. Such a case usually calls for skillful treatment and should be entrusted to a competent veterinarian. In all these manipulations hands and utensils should first be thoroughly disinfected.

After abortion, breeding should not again be attempted within two months, or until the discharge shall have ceased, as the uterus would not be normal and the animal either would not conceive or would abort again in a short time.

It is recognized that to carry out the foregoing recommendations will involve much labor and attention to detail, but they offer the system which up to the present time has been of the most practical use. This system has the additional advantage that the careful attention to sanitation and control of breeding operates to prevent the introduction and dissemination of other infectious diseases.

¹ Lugol's solution of iodine is compounded as follows: Iodine 5 parts, potassium iodide 10 parts, and boiled water to make 100 parts. Two parts of this compound in 100 parts of boiled water make a solution suitable for uterine irrigation. Lugol's solution may be purchased from druggists.

² A 1 per cent solution of common salt in boiled water at body temperature makes a suitable irrigating fluid. A heaping tablespoonful of dry salt weighs approximately 1 ounce, and this amount in 1 gallon gives the proper strength.